

PATENT SPECIFICATION

792,373

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International Classification :—B23b.

COMPLETE SPECIFICATION.

Improvements in and relating to Drilling Machines for Wet Drilling in Rock, Stone, Coal or the like.

We, HARDY PICK LIMITED, a British Company, of Mining Tool and Mining Engineer Works, Heeley, Sheffield 8, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement :—

This invention relates to drilling machines for wet drilling in rock, stone, coal or the like where a drilling tool is operated by the machine with a rotary action.

The term "wet drilling" is used to indicate that water or other flushing liquid is used for wetting the detritus removed by the drilling tool and for the purpose said drilling tool is hollow so as to provide an axial passage therethrough for conveying the flushing liquid to the drilling end of the tool, said flushing liquid being fed to the rear end of the drilling tool.

Hitherto, a coupling known in the trade as a "water coupling" has been interposed between the drilling machine and the drilling tool as a separate entity from the machine, said water coupling incorporating at one end thereof a chuck for the drilling tool and at the other end a rotatable spindle serving to carry the coupling on the machine and transmit drive therefrom to the chuck and drilling tool, means also being provided in the water coupling for the admission of water to the interior thereof and for conveying it to the axial passage of the drilling tool.

In most instances the water is fed into the water coupling through an inlet therein under pressure from a water mains supply or from an air-pressurised water tank.

In another instance a pump is incorporated in the water coupling for pumping the water from a tank or other source of supply, said

pump being operated by the drilling machine simultaneously as said machine drives the drilling tool, thus providing the advantage that, although the water coupling is a separate entity from the drilling machine, the pump is not a separate entity from the water coupling. 45

According to the present invention there is provided a drilling machine for wet drilling in rock, stone, coal or the like which incorporates a pump functioning as an integral part of the machine for pumping flushing liquid from a tank or other suitable supply source to the bore of a hollow drilling tool fitted into the chuck of the machine, said pump being driven by the driving spindle of the machine as said spindle drives the drilling tool, sealing means being provided around the driving spindle for preventing flushing liquid from the pump percolating rearwardly into the driving gear of the machine. 50 55 60

The pump may comprise a pair of meshing pinions operating in a chamber provided around a short length of the driving spindle of the machine between said spindle and a surrounding casing, one of the pinions being mounted on and rotatable with the driving spindle and the other being carried by a stub shaft journaled in a bearing in said casing, the chamber being provided with an inlet for flushing liquid at one side of the pinions and an outlet at the other side of the pinions and communicating, by radial ports and an axial passage in the driving spindle, with an axial passage in the inner end of the chuck which in turn communicates with the bore of the hollow drilling tool. 65 70 75

The machine may be operated hydraulically, electrically or by compressed air. 80

In the accompanying drawings :—

[—————]

Figure 1 is a sectional elevation of one form of wet drilling machine according to this invention and which is adapted for rotary operation.

5 Figure 2 is an end elevation.

The machine comprises a casing (not shown) housing electrically operated driving gear (not shown) having an internally toothed gear wheel 10 as the finally driven member for operating the driving spindle 11 for the drilling tool (not shown), said spindle being carried by and axially of the gear wheel 10 at one side thereof for rotation in roller bearings 12 mounted in an attached extension 13 of the casing at the drilling end thereof, said extension being provided with an attached end housing 14 into which the driving spindle 11 projects and drivingly engages a chuck 15 for receiving and driving the drilling tool.

Located in the housing 14 and keyed to the driving spindle by splines 16 is a pinion 17 meshing with and driving another pinion 18 which is carried by a stub shaft 19 journaled in a bearing 20 in the housing 14, that part of said housing accommodating the meshing pinions being formed as a chamber whereby said pinions constitute a pump therein, there being a water inlet 21 to the pump chamber at one side of the peripheries of the pinions and a water outlet 22 at the opposite side thereof, said inlet 21 communicating with a feed inlet 23 in the wall of the housing to which feed inlet a flexible water conveying pipe 24 is connected to a source of water supply.

Forwardly of the pump chamber is an annular water chamber 25 formed around the driving spindle 11 between it and the internal wall of the housing 14, there being a port 26 in the housing wall leading from the pump chamber outlet to the water chamber 25, the ends of said water chamber being provided with sealing rings 27 held in position around the driving spindle by a hollow radially ported cylindrical sleeve 28 the outer periphery of which is circumferentially recessed at 29.

The pump chamber is sealed at the rear thereof by a sealing ring 30 disposed around the driving spindle between said pump chamber and the roller bearings 12 for said spindle 11.

The outer end of the driving spindle is hollow from the point thereof which is surrounded by the water chamber 25 and its wall is provided with radial water conveying ports 31 communicating with said water chamber.

The forward end of the housing 14 is of enlarged diameter internally to accommodate a ball thrust bearing 32 for the chuck 15 which is provided with a rearwardly extending externally screw-threaded hollow stem 33 engaging the internally screw-threaded hollow

outer end 34 of the driving spindle 11 whereby said chuck is drivingly connected to said spindle with the bores of the spindle and the hollow stem of the chuck providing co-axially inter-communicating water passages. The ball thrust bearing 32 and the inner end of the chuck 15 in engagement therewith are protected against the ingress of foreign matter from the atmosphere by an end cover 35 which is screw-threaded at 36 on to the outer end of the housing and provided with an inturned circumferential flange 37 freely accommodating an outer circumferential flange 38 on the chuck.

An india-rubber sealing ring 39 is provided in the inner end of the chuck against which the inner end of the shank of the drilling tool makes abutment so that water is prevented from escaping through the chuck between it and the shank of the drilling tool.

In use, when the machine is put into operation for driving the drilling tool the pump is automatically operated at the same time to draw water from the feed inlet 23 into the pump chamber and force it out therefrom through the outlet 22 therein to the sealed annular water chamber 25 from whence the water flows through the radial ports 31 in the hollow end of the driving spindle to the bore thereof, and thence through the hollow stem 33 of the chuck and finally into the fore of the hollow drilling tool and down to the drilling end thereof.

What we claim is:—

1. A drilling machine for wet drilling in rock, stone, coal or the like incorporating a pump functioning as an integral part of the machine for pumping flushing liquid from a tank or other suitable supply source to the bore of a hollow drilling tool fitted into the chuck of the machine, said pump being driven by the driving spindle of the machine as said spindle drives the drilling tool, sealing means being provided around the driving spindle for preventing flushing liquid from the pump percolating rearwardly into the driving gear of the machine.

2. A drilling machine according to Claim 1, wherein the driving spindle of the machine is connected directly to the chuck and the pump operates in a chamber provided around a short length of the spindle between it and a surrounding casing.

3. A drilling machine according to Claim 2, wherein the pump comprises a pair of meshing pinions operating in the pump chamber, one of said pinions being mounted on and rotatable with the spindle and the other being carried by a stub shaft journaled in a bearing in a wall of said pump chamber, an inlet thereto being provided at one side of the pinions for connection to a source of supply of flushing liquid and an outlet being provided at the other side of the pinions in

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communication with an annular liquid chamber in turn communicating with a hollow end of the driving spindle and the interior of the chuck for the conveyance of flushing liquid to the bore of a hollow drill rod therein.

4. A drilling machine according to any preceding claim wherein the driving spindle of the machine operates in a casing having an annular chamber for flushing liquid around and in communication with a hollow end length of said spindle, said annular chamber being in communication with the pump chamber and the end of the driving spindle being fitted with a chuck adapted to connect the interior of the hollow driving spindle with the bore of a hollow drilling tool, means being provided in the chuck for sealing the engaging cylindrical walls of the chuck and the drilling tool.

5. A machine according to any of Claims 3 and 4, wherein the driving spindle rotates in bearings at each of its ends which are sealed from the pump chamber and annular liquid chamber by sealing means around said spindle.

6. A machine for wet drilling in rock, stone, coal or the like constructed, arranged and adapted to operate substantially as described with reference to the accompanying drawings.

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PROVISIONAL SPECIFICATION.

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We, HARDYFICK LIMITED, a British Company, of Mining Tool and Mining Engineering Works, Heeley, Sheffield 8, do hereby declare this invention to be described in the following statement:—

This invention relates to drilling machines for wet drilling in rock, stone, coal or the like where a drilling tool is operated by the machine with a rotary action.

The term "wet drilling" is used to indicate that water or other flushing liquid is used for wetting the detritus removed by the drilling tool and for the purpose said drilling tool is hollow so as to provide an axial passage therethrough for conveying the flushing liquid to the drilling end of the tool, said flushing liquid being fed to the rear end of the drilling tool.

Hitherto, a coupling known in the trade as a "water coupling" has been interposed between the drilling machine and the drilling tool as a separate entity from the machine, said water coupling incorporating at one end thereof a chuck for the drilling tool and at the other end a rotatable spindle serving to carry the coupling on the machine and transmit drive therefrom to the chuck and drilling tool, means also being provided in the water coupling for the admission of water to the interior thereof and for conveying it to the axial passage of the drilling tool.

In most instances the water is fed into the water coupling through an inlet therein under pressure from a water mains supply or from an air pressurised water tank.

In another instance a pump is incorporated in the water coupling for pumping the water

from a tank or other source of supply, said pump being operated by the drilling machine simultaneously as said machine drives the drilling tool, thus providing the advantage that, although the water coupling is a separate entity from the drilling machine, the pump is not a separate entity from the water coupling.

According to the present invention there is provided a drilling machine for wet drilling in rock, stone, coal or the like which incorporates a pump functioning as an integral part of the machine for pumping flushing liquid from a tank or other suitable supply source to the bore of a hollow drilling tool fitted into the chuck of the machine, said pump being driven by the driving spindle of the machine as said spindle drives the drilling tool, sealing means being provided around the driving spindle for preventing flushing liquid from the pump percolating rearwardly into the driving gear of the machine.

The pump may comprise a pair of meshing pinions operating in a chamber formed around a short length of the driving spindle of the machine between said spindle and a surrounding casing, one of the pinions being mounted on the driving spindle and the other being carried by a stub shaft journaled in a bearing in said casing, the chamber being provided with an inlet for flushing liquid at one side of the pinions and an outlet at the other side of the pinions and communicating, by radial ports and an axial passage in the driving spindle, with an axial passage in the inner end of the chuck which in turn com-

municates with the bore of the hollow drilling tool.

The machine may be operated electrically or by compressed air.

5 One form of wet drilling machine according to this invention and which is adapted for rotary operation comprises a casing housing electrically operated driving gear having an internally toothed gear wheel as the finally
10 driven member for operating the driving spindle for the drilling tool, said spindle being carried by and axially of the gear wheel at one side thereof for rotation in roller bearings mounted in an attached extension
15 of the casing at the drilling end thereof, said extension being provided with an attached end housing into which the driving spindle projects and drivingly engages a chuck for receiving and driving the drilling tool.

20 Located in the housing and keyed to the driving spindle by splines is a pinion meshing with and driving another pinion which is carried by a stub shaft journaled in a bearing in the housing, that part of said
25 housing accommodating the meshing pinions being formed with a chamber whereby said pinions constitute a pump therein, there being a water inlet to the pump chamber at one side of the peripheries of the pinions and
30 a water outlet at the opposite side thereof, the inlet communicating with an inlet in the wall of the housing to which a flexible water conveying pipe is connected to a source of water supply.

35 Forwardly of the pump chamber is an annular water chamber formed around the driving spindle between it and the internal wall of the housing, there being a port in the housing wall leading from the pump chamber
40 outlet to the water chamber, the ends of said water chamber being provided with sealing rings held in position around the driving spindle by a hollow radially ported cylindrical sleeve the outer periphery of which is circum-
45 ferentially recessed.

The pump chamber is sealed at the rear thereof by a sealing ring disposed around the driving spindle between said pump chamber and the roller bearings for the spindle.

50 The outer end of the driving spindle is

hollow from the point thereof which is surrounded by the water chamber and its wall is provided with radial water conveying ports communicating with said water chamber.

55 The forward end of the housing is of enlarged diameter internally to accommodate a ball thrust bearing for the chuck which is provided with an externally screw-threaded hollow stem engaging the internally screw-
60 threaded hollow outer end of the driving spindle whereby said chuck is drivingly connected to said spindle with the bores of the spindle and the hollow stem of the chuck providing co-axial intercommunicating water
65 passages. The ball thrust bearing and the inner end of the chuck in engagement therewith are protected against the ingress of foreign matter from the atmosphere by an end cover which is screw-threaded on to the
70 outer end of the housing and provided with an interned circumferential flange freely accommodating an outer circumferential flange on the chuck.

75 An india-rubber sealing ring is provided in the inner end of the chuck against which the inner end of the shank of the drilling tool makes abutment so that water is prevented from escaping through the chuck
80 between it and the shank of the drilling tool.

In use, when the machine is put into
85 operation for driving the drilling tool the pump is automatically operated at the same time to draw water from the inlet into the pump chamber and force it out therefrom through the outlet therein to the sealed
90 annular water chamber from whence the water flows through the radial ports in the hollow end of the driving spindle to the axial passage therein and thence through the hollow stem of the chuck and finally into the bore of the hollow drilling tool and down to the drilling end thereof.

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COMPLETE SPECIFICATION

1 SHEET

This drawing is a reproduction of the Original on a reduced scale.

Fig. 1.

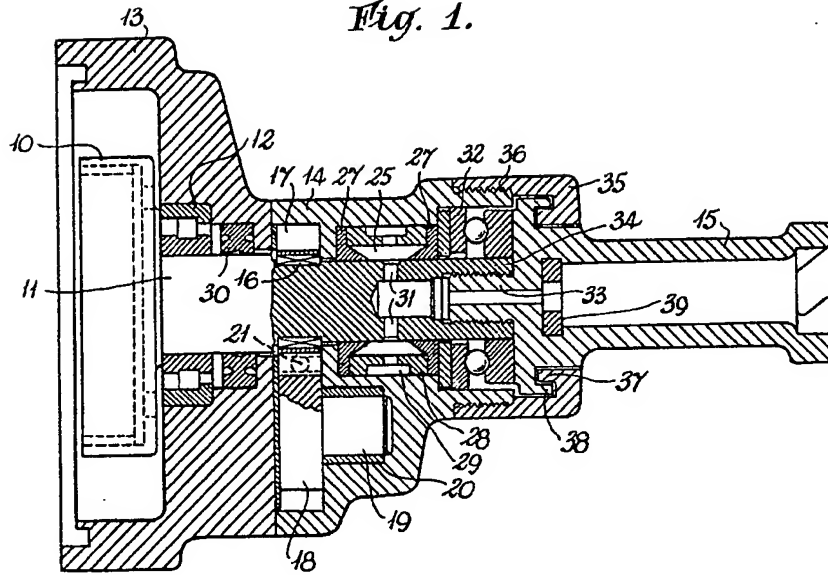
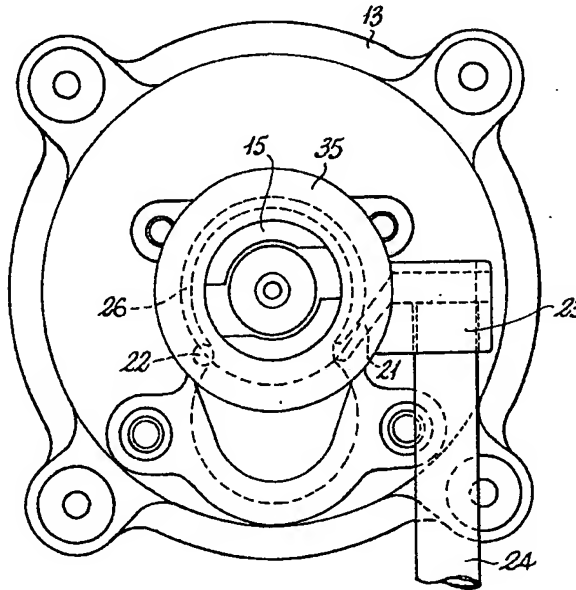


Fig. 2.



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